[SHORT NOTE]

RECORDS OF BATS (MAMMALIA: CHIROPTERA) FROM LATE HOLOCENE DUNE-SANDS AT TE WERAHI BEACH, NORTHLAND, NEW ZEALAND

B.J. GILL

Abstract. Four fragmentary fossil remains of bats (two teeth, a worn humerus and a fragment of radius) are reported from sand-dune sites near Te Werahi Beach, Northland, and are of Late Holocene age. They are the first bat fossils reported north of Waitomo (central North Island), and are identified as belonging to *Mystacina tuberculata, M. robusta* and *Chalinolobus tuberculatus.* Thus all three species were once sympatric in the Far North as at various other places throughout New Zealand.

KEYWORDS: Microchiropteran bats; fossil remains; Holocene; Northland; New Zealand.

INTRODUCTION

Faunal remains, particularly bones, from Holocene deposits in New Zealand form an important picture of the diversity and distribution of land vertebrates in the period immediately before the arrival of humans. Among small bones and bone fragments collected by Dr F.J. Brook in 1995 at Te Werahi Beach, Cape Maria van Diemen area, Northland, I recognised four fragments belonging to bats. They are now in the collection of Auckland Museum. Though fragmentary, the remains are noteworthy, given the lack of records of the fossil distribution of bats in Northland.

New Zealand has three species of microchiropterans—a *Chalinolobus* (Vespertilionidae) and two species of *Mystacina* (Mystacinidae). Their bones are small and thin, and only rarely survive in, and are recovered from, fossil deposits, although mystacinid bats may be well represented in food remains accumulated by predators (e.g. Worthy 2001). Daniel (1990) and Worthy *et al.* (1996) discussed the distribution of "subfossil" records of New Zealand bats. In the North Island there are no fossil bat records north of the Waitomo area (central North Island), where all three species are known from fossils. As for historic distributions, *M. robusta* is believed to be extinct and all living specimens were collected on islets off Stewart Island, and perhaps at Collingwood, northern South Island (Worthy *et al.* 1996). *M. tuberculata* and *Ch. tuberculatus* are still extant in Northland (Daniel 1990).

REFERENCE MATERIAL

The fossil remains from Te Werahi were identified by comparison with diagrams in Vaughan (1970), and with the following reference skeletons in the Auckland Museum collection:

Mystacina tuberculata. M36 (cranial and post-cranial) and M512 (post-cranial), Little Barrier

Island. M311 (skull and mandibles), male, Omahuta, Northland. M301 (skull and mandibles), male, Te Rimu area, upper Waimarino River.

Chalinolobus tuberculatus. M34 (cranial and post-cranial), Rewiti, Northland.

STUDY AREA

The northern tip of the North Island has a coastline of rocky headlands linked by sandy beaches. Dunefields behind Te Werahi Beach are presently sparsely vegetated and mobile, but palaeontological evidence shows that they were forested at various times during the past 4,000 years (Brook 1999). The most recent disturbance of the dune forest was its destruction 800–550 years BP, following Polynesian settlement in the area.

The bat remains at Te Werahi were found in sandy palaeosols at two sites. One site (Fossil Record File number M02/f85; grid reference NZMS 260, M02/809483; shown as Site 21 in fig. 1 of Brook 1999) contained a diverse landsnail fauna indicative of a forest setting. Radiocarbon dates on shells of the landsnail *Placostylus ambagiosus* gave a calibrated age of 2886–1996 years BP for M02/f85 (Brook 1999).

At the other site (M02/f110; NZMS 260 M02/815498; seaward of Site 29 in fig. 1 of Brook 1999) rhizomorphs of trees and shrubs were common (F.J. Brook, pers. comm.). The fossil fauna at M02/f110 has not been dated, but is inferred from stratigraphy to be younger than 4400 years BP (F.J. Brook, pers. comm.).

RESULTS AND DISCUSSION

The following four bat remains were identified:

Mystacina tuberculata

(1) Upper left canine (M879) from M02/f85. Total length, including root, 4.2 mm. The enamelled half of the tooth closely matches in shape and size the corresponding teeth in skulls of the reference examples of *M. tuberculata*.

(2) Proximal end of radius (M880) from Te Werahi Beach area (precise site at Te Werahi not known as site number was mislaid during museum processing). In size and shape this closely matches reference samples of *M. tuberculata* but differs in shape from the example of *Chalinolobus*.

Mystacina robusta

(3) Lower left canine (M878) from M02/f85 (Fig. 1). Total length, including root, 5.2 mm. It is similar in shape to reference examples of this tooth in *M. tuberculata* (example shown in Fig. 1), but is much larger. It is assigned to *M. robusta* on size. It differs slightly from *M. tuberculata* in being less recurved towards the posterior, a feature not evident from the angle in Fig. 1.

Chalinolobus tuberculatus

(4) Left humerus (M877) from M02/f110. Total length 23.6 mm, but ends worn. Despite wear obliterating various features of this bone, I have assigned it to *Chalinolobus tuberculatus*, because the shape of the trochlea at the distal end clearly matches the condition in the latter species rather than in *Mystacina tuberculata*.

The fossil remains reported here establish that all three species of New Zealand bats were present in the Far North within the last few thousand years. The two species of *Mystacina* were

Fig. 1. Lower left canines of contemporary *Mystacina tuberculata* from Little Barrier Island (M36, right) and fossil *M. robusta* from Te Werahi (M878, left). The larger tooth (including root) is 5.2 mm long. Photo: T. Landers.

sympatric and contemporaneous in the Te Werahi area, as indicated by their presence at site M02/f85. *Chalinolobus* may or may not have been contemporaneous with the mystacinids. Not surprisingly, the sites were forested at the times the bats lived there.

The record of *Mystacina robusta* extends the known distribution of this large extinct species to the northern end of the country. It was previously not known north of Waitomo (Worthy *et al.* 1996).

Acknowledgements. I thank Fred Brook for presenting to Auckland Museum the vertebrate material collected during his study of fossil land-snails at Te Werahi; S. Ingleby (Australian Museum) and Trevor Worthy for providing diagrams that helped with the identification of the bat bones; Todd Landers for taking the photograph; and Fred Brook for helpful comments on a draft of this note.

REFERENCES

BROOK, F.J.
1999 Stratigraphy, landsnail faunas and paleoenvironmental history of coastal dunefields at Te Werahi, northernmost New Zealand. *Journal of the Royal Society of New Zealand* 29: 361–393.

DANIEL, M.J.
1990 Order Chiroptera. Pp. 114–137. *In:* King, C.M. (ed.) *The Handbook of New Zealand Mammals.* Oxford University Press, Auckland.

VAUGHAN, T.A.
1970 The skeletal system. *In:* Wimsatt, W.A. (ed.) *Biology of Bats.* Vol. 1. Academic Press, New York.

WORTHY, T.H.
2001 A fossil vertebrate fauna accumulated by laughing owls (*Sceloglaux albifacies*) on the Gouland Downs, northwest Nelson, South Island. *Notornis* 48: 225–233.

WORTHY, T.H., M.J. DANIEL and J.E. HILL
1996 An analysis of skeletal size variation in *Mystacina robusta* Dwyer, 1962 (Chiroptera: Mystacinidae). *New Zealand Journal of Zoology* 23: 99–110.

B.J. GILL, Auckland Museum, Private Bag 92018, Auckland, New Zealand.